

REMARKS

In the Office Action dated April 12, 2006, the Examiner rejected all claims as indefinite under §112, second paragraph, because independent claim 1, from which all subsequent dependent claims depended, included a limitation beginning with the phrase “wherein in the event the actual curve differs from the set curve at a time of comparison....” The Examiner stated that it was unclear whether the limitation that followed this introductory clause was mandatory or optional. (Office Action, p. 2.)

In response to this rejection, Applicant has amended claim 1 to make clear that *the limitation is mandatory*, by eliminating the terminology “in the event the actual curve differs from the set curve.” That is to say, amended claim 1 would not be infringed by a welding method in which the actual curve never differed from the set curve. No change to claim 1 is intended by the amendment, other than making clear that the limitation is mandatory. Accordingly, Applicant respectfully requests that that ground of rejection be withdrawn.

The Examiner then proceeded to examine the claims based upon the assumption that the limitation was optional, and also based upon the limitation being mandatory.

Under the assumption that the limitation was optional, the Examiner:

a) rejected claims 1, 5, 8, 9 and 12 as anticipated by Peter (U.S. Patent 4,631,685) (Office Action, pp. 3-4);

b) rejected claims 2-7, 9-10 and 14-15 as unpatentable over Peter as applied above and further in view of DE 34 29 776 (“Moll”) (Office Action, pp. 4-6); and

c) rejected claims 1 and 13 as unpatentable over Peter and Moll as applied above and further in view of Grewell (U.S. Patent 5,855,706) (Office Action, pp. 6-7).

Because Applicant has amended claim 1 to make clear that the limitation is mandatory, these grounds of rejection should be withdrawn.

Under the assumption that the limitation was mandatory (which assumption Applicant has confirmed by his amendment of claim 1 herein), the Examiner:

(a) rejected claims 1-10, 12, and 14-15 as unpatentable over Peter, in view of (the translation of) Moll and Van Brakel (EP 0 319 631) (Office Action, pp. 7-11); and

(b) rejected claims 1 and 13 as unpatentable over Peter, in view of (the translation of) Moll, Van Brakel, and Grewell. (Office Action, pp. 11-12)

For the reasons set forth below, Applicant respectfully requests that these rejections be withdrawn.

The rejection of claims 1-10, 12, and 14-15

The Examiner will recall that in the previous Office Action, the Examiner had rejected claims 1-10, 12 and 14-15 based upon the combination of Peter, Moll and the Picchio Reference, rather than the combination of Peter, Moll and *Van Brakel*. (Office Action, June 30, 2005, pp. 2-5)

The Examiner had asserted that the Picchio Reference taught the claim limitation of “altering a welding process parameter” in response to “the actual curve differ[ing] from the set curve.” (Office Action, June 30, 2005, p. 3) In response, without waiving other potential bases for distinguishing claim 1 from the cited art, Applicant demonstrated that the Picchio Reference could not be used to support the rejection of amended claim 1, because that reference taught only varying the *time* of a weld, while the amended claim 1 limitation was that welding process parameters *other than time* be altered. In addition, the Picchio Reference taught away from altering welding process parameters other than time based on a difference between an actual curve and a set curve. (Response, December 30, 2005, pp. 8-10)

In response, the Examiner in the current Office Action no longer cites the Picchio Reference; the current Office Action replaces the Picchio Reference with Van Brakel, and the Examiner now asserts that Van Brakel in combination with Peter and Moll renders amended claims 1-10, 12 and 14-15 unpatentable. (Office Action, pp. 7-11) Without waiving other arguments concerning whether amended claim 1 is taught by the combination of references cited by the Examiner, Applicants respectfully submit that Van Brakel cannot

be combined with Peter and Moll to support the rejection of amended claim 1 for the reasons that follow.

A feature of amended claim 1 which leads to an important advantage in the welding process is the measurement of a time-dependent welding parameter during the course of the welding (amended claim 1, lines 6-7), the comparison of that measured actual welding parameter with a set curve (line 8), and the adjustment of a welding process parameter (other than the time of the weld), based on the difference between the measured actual welding parameter and the set curve, to bring the measured actual welding parameter toward the set curve. (lines 9-18) This is in effect a feedback loop, where one or more process parameter adjustments are made as time passes during the welding process, in response to a difference between the measured value of a welding parameter and the set curve, in an effort to reduce that difference. The references cited by the Examiner, alone or in combination, do not suggest this new and valuable method.

The first reference cited by the Examiner, Peter, teaches that a welding parameter (head displacement) may be monitored, and that when it reaches a predetermined value the energy may be turned off. (Abstract, lines 6-8; col. 1, lines 34-41; col. 3, lines 55-59) However, Peter does *not* suggest (1) altering any welding process parameters other than the time of the weld, or (2) attempting to use a difference between a time-dependent actual curve and a set curve as the basis of feedback by adjusting a process parameter to make the actual curve approach a set curve. Peter simply turns off the energy when the head reaches a predetermined position, and removes the force when the head reaches a further predetermined position. The resulting part is then accepted or rejected.

In the Office Action, the Examiner appreciates that Peter therefore fails to teach the key limitations of amended claim 1, that a welding process parameter other than time be controlled, that it be controlled in response to the deviation of a measured time-dependent welding parameter from a set curve, and that the control be designed to bring the measured time-dependent welding parameter toward the set curve. The Examiner states that

Peter ... does not disclose, depending on the existing difference between the set curve and the actual curve, of at least one welding process parameter

affecting welding being altered to a value based on that existing difference such that an equalization of the set curve and the actual curve occurs during further welding.

(Office Action, p. 8) Thus, Peter does not appreciate the benefits of claim 1's use of the difference between a time-dependent actual curve and a set curve as the basis for altering a welding process parameter to reduce that difference.

Moll teaches monitoring a welding parameter on an ongoing basis, and comparing it to tolerance curves to ensure proper quality control (Translation, claim 1, pp. 2-3; p. 7), but as the Examiner recognizes it *also* does not teach altering a welding process parameter based on the relationship of the monitored parameter to the tolerance curve. Rather, Moll teaches terminating the weld if the welding parameter travels outside the tolerance curve, or rejecting the "bad" pieces. (Translation, claim 4, p. 3; p. 7; p. 15) Thus, Moll also fails to appreciate the benefits of claim 1's use of the difference between a time-dependent actual curve and a set curve as the basis for altering a welding process parameter to reduce that difference.

Thus, neither Peter nor Moll appreciate and teach the advantages of amended claim 1. Peter and Moll, even taken together, do no more than teach that by monitoring a parameter, unsatisfactory pieces can be discarded. Indeed, by teaching terminating the weld process and rejecting bad pieces upon the welding parameter being outside a tolerance limit, Moll *teaches away from* attempting to bring the welding parameter back to a desired value by altering a welding process parameter based upon the welding parameter deviating from a desired set curve.

Applicant respectfully suggests that Van Brakel does not supply the missing limitations of claim 1. Van Brakel teaches that the power of an ultrasonic generator may be controlled by monitoring oscillator output voltage and current levels, comparing those values to set *values*, and adjusting oscillator frequency or pulse width to make the measured value equal the set *value*. (Abstract; col. 3, lines 2-10; col. 4, lines 16-28)

But in claim 1 the set curve must be of a time-dependent welding parameter, while in Van Brakel *the set value is not time-dependent*, and hence *no set curve of a time-dependent*

welding parameter exists. Van Brakel discloses set points and set values. (See Abstract, lines 8, 11; col. 3, lines 3,7,10; col. 4, lines 21-22, 28) In Van Brakel, the value of the set points may vary, but not as a function of time. The set point values may depend only upon measured operation parameters such as temperature, and hence no pre-existing time-dependent set curve exists. (claims 2-5, col. 5)

Moreover, while Van Brakel asserts that the set values may be modified based upon operation parameters *for ultrasonic cleaning*, and sets forth reasons why that may be desirable *in the ultrasonic cleaning case*, there is no discussion in Van Brakel of ultrasonic welding, or of any desirability of modifying set values in ultrasonic welding. Thus, adding Van Brakel to Peter and Moll still does not provide key features of claim 1: that a *time-dependent pre-existing set curve* of a welding parameter be used; that a measured actual welding parameter be compared to that pre-existing set curve; and that a welding process parameter be adjusted based on the difference, in order to make the actual measured welding parameter value approach the set curve. *The references, alone or in combination, do not teach the desirability of altering a welding process parameter during the welding process, based upon the difference between an actual welding parameter and a time-dependent set curve, in order to make the actual curve approach the set curve.*

There is a further reason why the combination of Peter, Moll and Van Brakel does not render amended claim 1 unpatentable.

The mere fact that references can be combined or modified does not render the resultant combination obvious *unless the prior art also suggests the desirability of the combination. In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990)

Manual of Patent Examining Procedure (MPEP) 2143.01 III (Eighth Ed., Rev. August 2006) (Emphasis added.) That is, prior art references cannot be combined cumulatively to demonstrate every limitation of the claimed invention, *unless there is a motivation to combine those references.*

The teaching or suggestion to make the claimed combination ... must both be found in the prior art, *not in applicant's disclosure. In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

MPEP 2143 (Eighth Ed., Rev. August 2006) (Emphasis added.) In other words, hindsight may not be the basis for choosing which elements out of each reference should be combined.

That test is failed here. Even assuming for purposes of discussion that together Peter, Moll and Van Brakel contain each isolated limitation of claim 1 (which Applicant denies, as discussed above), *there is no suggestion in any of those references, that the combination of the limitations selected by the Examiner would be beneficial.*

Although Peter, Moll and Van Brakel all deal with control of ultrasonic processes, *none* sees the advantage of using the “feedback” technique of Applicant’s claim 1 to control a welding process parameter during the course of the weld process, by comparing a measured actual value of a time-dependent welding parameter to a set curve of that time-dependent parameter, and adjusting the welding process parameter so as to reduce the difference between the actual measured value and the set curve. The failure of any of these references to take this step to improve weld quality, even as they measure welding parameters, suggests that the combination is not suggested in the prior art, and is not obvious. Indeed, the fact that Peter and Moll both rely upon after-the-fact discarding of unsatisfactory welds, rather than using their measurements to change process parameters during the weld so as to generate good welds, further suggests that the approach of claim 1 is not obvious. Therefore, claim 1 as amended should be allowed.

Claims 2-10, 12 and 14-15 depend directly or (in the case of claim 9) indirectly from amended claim 1. Insofar as claim 1 now is in condition for allowance, therefore, claims 2-10, 12 and 14-15 also are.

The rejection of claims 1 and 13.

Under the assumption that the limitation was mandatory, the Examiner also rejected claims 1 and 13 as unpatentable over Peter, in view of (the translation of) Moll, Van Brakel, and Grewell. (Office Action, pp. 11-12) Applicant respectfully requests that that rejection be withdrawn as well.

In thus rejecting claim 1, the Examiner stated that

Claim 1 [is] rejected under 35 U.S.C. 103(a) as being unpatentable over Peter, [Moll], and Van Brackel *as applied to claim 1 above*, and further in view of Grewell. (Emphasis added.)

(Office Action, p. 11) Because the rejection of claim 1 “as applied above” has been shown to be improper, this secondary rejection should be withdrawn as well.

Moreover, the Examiner stated that “Peter ... suggests changing the welding displacement and energy.” (Office Action, p. 11.) (The Examiner does not cite any specific portion of Peter.) However, as discussed above the Examiner has recognized that

Peter ... does not disclose, depending on the existing difference between the set curve and the actual curve, of at least one welding process parameter affecting welding being altered to a value based on that existing difference such that an equalization of the set curve and the actual curve occurs during further welding.

(Office Action, p. 8). Thus, the Examiner recognizes that Peter does not teach claim 1, in its prior form or as now amended.

In addition, Peter discloses turning off the energy based on the value of a specific parameter, head displacement. (Abstract, lines 6-8; col. 1, lines 34-41; col. 3, lines 55-59.) The turn-off occurs when a preset value is reached, *not when measured actual displacement deviates from a desired displacement*. In Peter, it is expected that the chosen preset displacement value which triggers the energy turn-off will be reached in the course of every normal weld process. Moreover, when that preset value is reached, the energy supply is not adjusted to a new value depending on the displacement, in an effort to correct for the deviation between an actual and a set curve. It is turned off. Thus, Peter does not render claim 1 obvious.

The Examiner further stated that

[Moll] utilizes the changes resulting from measuring the power to change the energy supplied to the sealing jaws which also relates to the force acting on the parts and the energy input into the parts welded.

(Office Action, p. 11.) (The Examiner does not provide specific citations to portions of Moll.)

Applicant respectfully suggests that Moll does not teach the limitations set forth above now at issue in amended claim 1. Moll compares actual to set values to classify welding parts as of poor quality for sorting purposes:

If deviations ... occur in the actual value curves, ... an output unit is activated ... so that badly welded parts can be separated. Only welded parts that correspond to the tolerance specifications are further processed.
(Translation, p. 15, lines 10-16)

But this in no way suggests altering one of the welding process parameters set forth in amended claim 1 to cause an actual value to converge toward a set value. Indeed, as discussed above the fact that Moll teaches terminating the weld process and/or discarding parts when a measured value deviates from a tolerance range, *teaches away* from altering a welding process parameter but continuing with the weld, as claim 1 teaches.

The Examiner further stated that “Van Braken suggests [modifying] frequency.” (Office Action, p. 11) However, as discussed above, in Van Brakel *set points*, not set curves, are used, and the set point values vary, not as a function of *time* but as a function of *measured operation parameters* such as temperature. Moreover, while Van Brakel asserts that the set values may be modified based upon operation parameters *for ultrasonic cleaning*, and sets forth reasons why that may be desirable *in the ultrasonic cleaning case*, there is *no discussion* in Van Brakel of ultrasonic welding, of any desirability of modifying set values in ultrasonic welding, or of what factors should be the basis of any modification of such set values.

Finally, the Examiner stated that

Grewell '706 further suggests varying the motional amplitude ... and ... the frequency... [and] suggests that variation of the amplitude and frequency results in a stronger weld.

(Office Action, p. 12.) But Grewell does not supply the deficiencies in Peter, Moll and Van Brakel discussed above.

In Grewell adjustments are made to a predetermined new value. See, e.g., Figure 6, col. 9, lines 34-36, col. 1, lines 29-31 (“the motional amplitudes and engaging forces of the

ultrasonic transducer horn in contact with the workpiece are varied over particular profiles during the weld cycle”) (emphasis added). By contrast, in claim 1 as amended herein the magnitude of the adjustment may be chosen depending on the magnitude of the divergence between the time-dependent set curve and the actual value, in order that the actual value converges to the set value.

Also, in Grewell the adjustment is not for the purpose of making an actual curve conform to a set curve from which it has diverged. The adjustment is made in normal operation at a certain point in the process. In Grewell, Figure 6 shows the amplitude being reduced to a predetermined lower value, so that melting will be slower; there is no effort being made to match any deviating value to a set curve, and indeed no suggestion that any deviation from any expected value has occurred. In amended claim 1 herein, however, the purpose of the adjustment is to make a diverging actual curve converge to a set curve. In amended claim 1, a welding parameter is adjusted when the actual measured value of a parameter deviates from the time-dependent value desired (i.e., from the set value or curve). And in claim 1 when an adjustment is made because a deviation has occurred the magnitude of the adjustment may be chosen based upon the magnitude of the deviation in order to cause the deviation to be reduced or eliminated (i.e., to cause the measured value to approach or reach the set value).

In sum, none of the references cited by the Examiner, alone or in combination, teach the alteration of one of the specified welding process parameters set forth in amended claim 1, in response to an actual curve differing from a time-dependent set curve, and based upon that difference, so that the difference is reduced and the curves converge.

Accordingly, Applicant asks that the Examiner reconsider and allow claim 1, as amended herein.

Claim 13 depends from amended claim 1. Insofar as claim 1 now is in condition for allowance, therefore, claim 13 also is.

Claims 2-10, 12-15

Claims 2-10, and 12-15 depend directly or (in the case of claim 9) indirectly from amended claim 1. Insofar as claim 1 now is in condition for allowance, therefore, claims 2-10 and 12-15 also are. Accordingly, Applicant asks that the Examiner reconsider and allow claims 2-10 and 12-15, as amended herein.

CONCLUSION

In view of the foregoing amendment and remarks, Applicant considers the Response herein to be fully responsive to the referenced Office Action, and respectfully submits that the pending claims are in condition for allowance. Early and favorable reconsideration is therefore respectfully solicited.

If there are any remaining issues or the Examiner believes that a telephone conversation with Applicant's attorney would be helpful in expediting the prosecution of this application, the Examiner is invited to call the undersigned at 617-832-1118. Use of the Federal Relay Service to facilitate the call is invited.

Should an extension of time be required, Applicant hereby petitions for same and requests that the extension fee and any other fee required for timely consideration of this application be charged to Deposit Account **No. 06-1448**.

Respectfully submitted,

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